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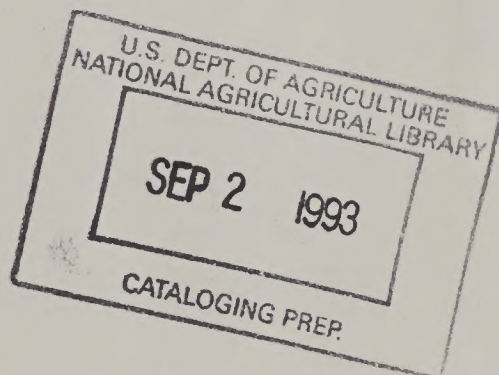
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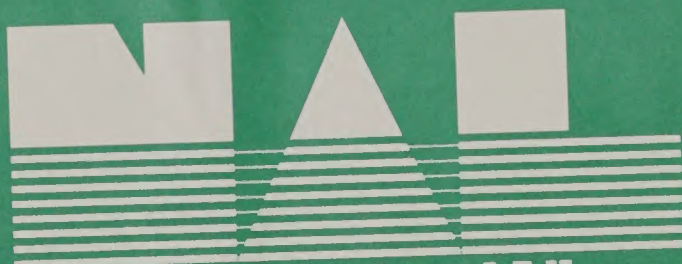
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Interregional Variation in Food Expenditure Patterns of Low-Income Households

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INTERREGIONAL VARIATION IN FOOD EXPENDITURE PATTERNS OF LOW-INCOME HOUSEHOLDS.
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ABSTRACT

Household food consumption patterns differ significantly among geographic regions in the United States. The variations in low-income household food expenditures are identified for major food categories in nine census regions. A multiple regression model is developed to estimate changes in food expenditure patterns associated with changes in income for low-income households. Our results have important implications for Federal programs such as the Food Stamp Program.

Keywords: Food expenditure, food consumption, region, low-income households, income elasticity of food.

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SUMMARY

Food expenditure patterns of low-income households are analyzed, with particular emphasis on interregional variations. The objectives are to (1) determine the influence of the socioeconomic characteristics of households in nine U.S. census regions, and (2) estimate the effect of changes in household income on expenditures for seven food categories. In combination, results provide a basis for assessing the food expenditure patterns of low-income households and anticipating the effects of Federal assistance programs on the food expenditures of low-income households in different regions of the country.

Data for the multiple regression analysis were developed from the Nationwide Food Consumption Survey conducted in 1977 and 1978.

We found substantial variation among regions in both the marginal propensity to consume (MPC) and the income elasticities of the seven food groups. The results suggest that region continues to be a significant factor in food consumption patterns and that Federal programs based on national eligibility standards and uniform benefits have different effects in various regions of the country.

Interregional Variation in Food Expenditure Patterns of Low-Income Households

Masao Matsumoto

INTRODUCTION

Poverty in the United States continues to be an area of public concern and its alleviation has been a national goal for over two decades. Government programs have tried to eliminate hunger and hunger-related illness in low-income households. Greater knowledge about the food expenditure behavior of low-income households would help policymakers assist these households in improving their nutritional intake.

Food expenditure patterns of low-income households are analyzed, with particular emphasis on interregional differences. Differences in expenditures on seven food budget categories are estimated to determine if there are differences in the way low-income households with various socioeconomic characteristics alter their food expenditures with income changes. This information should be particularly useful in assessing the effects of Federal programs, such as the Food Stamp Program, on households in various regions of the Nation.

OBJECTIVES

This study has two objectives. First, we determine the influence of household characteristics on food expenditures of low-income households. Factors which influence food expenditures and differences among regions are identified.

Second, we determine the effect of changes in household income on expenditures for seven food categories. Information concerning the food expenditure patterns of low-income households to changes in income provides a basis for anticipating the dietary influence of assistance programs, such as food stamps or other cash grants. In combination, the results provide a framework for analyzing food expenditures and the effects of assistance programs on low-income households in various regions of the country.

REGIONAL VARIATION IN FOOD CONSUMPTION

Region of the United States has been recognized as an important variable in explaining significant differences in food purchase and consumption patterns (3), (2). 1/ 2/ A brief review of the origins and development of regional economies and social behavior patterns provides a basis for determining how regionality may be expected to affect the food purchasing patterns of low-income households.

Each U.S. region is endowed with a unique set of natural resources: climate, soils, topography, rivers, and other natural features. These factors have influenced the quantity and variability of foods available for household consumption. Various regions of the country were settled by people bringing with them their cultural, ethnic, and social backgrounds, including living and dietary habits. Settlers used natural resources to develop local agricultural economies and social structures that were adapted to the region.

To some extent the food consumption patterns established over the years persist today. These regional differences may diminish as local customs and cultural patterns break down because of vast changes in national transportation and communication facilities and as more foods are marketed nationally. Greater mobility and capital resources also tend to diminish income and employment variability among regions.

Government programs, such as the Food Stamp Program, are designed to provide benefits nationally, without regard for regional differences in food consumption patterns. Critics of this policy contend that equivalent nutrition levels should be given greater consideration. Some regional variations in food expenditure patterns persist, and recognition of these variations should help policymakers more effectively plan and develop programs to assist low-income households.

DATA

Data for this study were developed from the Nationwide Food Consumption Survey (NFCS) conducted in 1977 and 1978. Specifically, we used the low-income supplemental survey of about 4,600 households. In this survey, food consumption and expenditure data were collected from the head of the household or the person responsible for purchasing food and planning meals. Screening of the households was based on the nominal income of the household and the criterion was whether the household was eligible to participate in the Food Stamp Program. Interviewers obtained detailed information on the quantities and costs of all foods purchased and consumed by the households during the 7-day period prior to the day of the interview.

Editing of the data involved adjusting or eliminating observations for which specific information was either inconsistent or missing. The money expenditure for purchased foods was the basic variable analyzed in this study. The data were sorted by the nine census regions in the 48 contiguous States and the District of Columbia. States in each census region are shown in table 1.

1/ Underscored numbers in parentheses refer to references.

2/ See (3) for an early analysis of region as an explanatory factor in determining household food consumption and (2) for a more recent analysis.

REGIONAL VARIATION OF HOUSEHOLD CHARACTERISTICS

Table 2 compares characteristics of low-income households in the nine census regions with the national sample averages.

Monthly average income tends to be higher in the northern and western regions and somewhat lower in the South. Racial distribution varies significantly, with relatively higher proportions of blacks in the Mid-Atlantic and southern States and relatively higher concentrations of Hispanics in the Southwest and West. Food stamp participation also varies significantly, from a low of 30 percent in the north-central States to a high of 70 percent in the urban Mid-Atlantic States. Also of interest is the education level of household heads. Persons who attended college or post-high school institutions accounted for a surprisingly high 28 percent in the New England States and nearly 20 percent of the sample in the Mountain and western States.

The age distribution of the household heads also varied substantially by regions. The urban Northeast and West had high percentages of household heads under 40 years of age, while States in the Midwest and South had relatively greater proportions of household heads who were 65 and older.

Table 3 shows household expenditures for various categories of foods. The values indicated are averaged by region and represent the monetary value of food purchased over the 7-day survey period.

Table 1--Census regions of the United States

Region 1.	New England (NE)--Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut
Region 2.	Mid-Atlantic (MA)--New York, New Jersey, Pennsylvania
Region 3.	East North-Central (ENC)--Ohio, Indiana, Illinois, Michigan, Wisconsin
Region 4.	West North-Central (WNC)--Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas
Region 5.	South Atlantic (SA)--Delaware, Maryland, Virginia, District of Columbia, West Virginia, North Carolina, South Carolina, Georgia, Florida
Region 6.	East South-Central (ESC)--Kentucky, Tennessee, Alabama, Mississippi
Region 7.	West South-Central (WSC)--Arkansas, Louisiana, Oklahoma, Texas
Region 8.	Mountain (M)--Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada
Region 9.	Pacific (P)--Washington, Oregon, California

Table 2--Characteristics of low-income households by region

Item	Unit	Region									National
		1 NE	2 MA	3 ENC	4 WNC	5 SA	6 ESC	7 WSC	8 M	9 P	
Avg. monthly income	Dollars	410*	396*	378*	353	353	348*	335*	408*	418*	360
Household size	Number	3.03*	3.36	3.48*	2.96*	3.34	3.36	3.18*	3.66*	3.11*	3.30
Residence:	Percent										
Central city	do.	49*	73*	41*	23*	32*	19*	35	46*	35	35.8
Non-metro	do.	36*	19*	29*	76*	51*	72*	52*	47	26*	48.4
Suburban	do.	15	8*	29*	1*	17	8*	13*	47*	39*	15.8
Male household head	do.	51	45*	51	52	50	56*	52	53	51	51.2
Food stamp participant	do.	56*	70*	51*	30*	43	42*	44	45	32*	45.5
School lunch participant	do.	31*	46*	30*	34*	45*	38	42	44*	33*	40.8
Race:											
White	do.	89*	29*	48*	83*	40*	52*	41*	50*	48*	44.5
Black	do.	4*	41*	47	15*	60*	46	52*	7*	26*	47.3
Hispanic	do.	6	28*	3*	1*	0*	1*	6	41*	23*	7.2
Other	do.	1	2*	2*	1*	0*	1	1	3*	3*	1.0
Education level:											
0-8 years	do.	19*	34*	33*	31*	46	55*	54*	31*	30*	45.2
9-12 years	do.	53*	60*	57*	60*	49	42*	41*	52*	51*	48.0
over 12 years	do.	28*	6	10*	9*	5*	3*	5*	17*	18*	6.8
Employed	do.	47*	25*	25*	24*	35*	29	31	34*	32	30.8
Tenure:											
Owned	do.	29*	14*	34*	54*	38	52*	48*	59*	30*	40.8
Rent	do.	68*	84*	63*	41*	56	40*	47*	38*	67*	54.3
Noncash rent	do.	3*	1*	2*	5	6*	8*	5	3*	3*	4.9
Life cycle variables:											
Male head of household--											
Under 40, eldest child	do.	31*	14	16*	15	14	15	13	17*	19*	14.8
Under 40, eldest child over 12	do.	1/0*	1*	1*	3*	2	2	2	1*	2	1.8
Under 40, no child	do.	11*	6*	5*	2*	3*	2*	2*	7*	8*	3.6
41-64, children	do.	7*	10	11	13*	12	12	11	14*	12	11.6
41-64, no child	do.	8*	14	13	17*	17*	13	14	11*	18*	14.5
65 and over	do.	7*	7*	11*	15	11*	19*	18*	8*	7*	13.7
Female head of household--											
Under 40, eldest child	do.	18*	23*	18*	9*	12	8*	10*	14*	12	12.5
Under 40, eldest child over 12	do.	4*	5*	3	1*	3	2	2	3	3	2.7
41-64, children	do.	4*	10*	9	5*	11*	7	8	8	6*	8.7
65 and over	do.	10*	7*	10*	22*	16	20*	19*	17	14	16.0

* = Greater than national average \pm 0.95 percent confidence interval.

1/ Less than 0.5 percent.

Table 3--Food expenditures, average per household per week, by region

Item	Region														National average
	1	2	3	4	5	6	7	8	9						
	NE	MA	ENC	WNC	SA	ESC	WSC	M	P						

Total food expenditures at home varied by region, from a low of \$35 per household in the west north-central States to a high of nearly \$44 in the Mid-Atlantic States. Some of the regional variation may be related to the differences in average size of households and the average household income.

The proportion of income spent for food by low-income households is nationally consistent, with all regions spending close to 40 percent of income for food. This figure contrasts sharply with the 1978 national average of 18 percent of income spent for food.

VARIABLES INCLUDED IN THE ANALYSIS

The household characteristics affecting food expenditures were analyzed and included on the basis of logic, economic theory, or previous empirical work. The selection process was constrained because of the nature of the NFCS data and the purposes of that survey. Specifically, several important explanatory variables, such as differences in local prices, the availability and use of credit, net worth, and expectations of market tendencies were excluded from explicit considerations because information was not available.

Independent Variables

Money income is generally considered to be one of the most important determinants of consumer behavior. In this study we employ total weekly income before taxes as an independent variable, because low-income households, as a rule, do not pay a significant portion of their income for taxes. Money income is an aggregative concept and includes all revenue from wages and salaries, self-employment, rent from property, transfer payments, and cash gifts. Also included as money income is the cash value of bonus food stamps that the household received. Other in-kind transfers are not explicitly considered as income, because they would have only an indirect effect on food expenditures. Household income, adjusted on a per capita basis, was tried but the statistical results were less satisfactory than the models that included total household income as an independent variable. This may be because of relative under-representation of larger households in the NFCS sample, or because the per capita expenditure for food was more responsive to total income than it was to income adjusted on a per capita basis.

Family size and income are important determinants in assessing expenditure behavior and the relative well-being of household members. These conditions are recognized in the Food Stamp Program and we believed that family size would be an important variable.

Family size is defined as the number of persons in the household who consumed 10 or more meals at home during the 7-day period. In most cases, this coincided with the number of persons living in the household, but in some cases, there were family members who ate most of their meals away from home.

Race has been found to be an important variable in explaining consumer expenditures in a number of consumer demand studies (1), (2). The interviewer determined the race of questionnaire respondents. Races included in the survey were white, black, Hispanic origin, and other. Urbanization was included based on the location of the sample household. The degree of urbanization could affect the lifestyle and the availability of foods to the household. Households were classified as being located in central cities, suburban, or rural areas.

Another variable included in the analysis was educational level of the household head, which could affect the dietary choices of the meal planner. Tenure, whether the household owned or rented its living quarters, could affect the proportion of disposable income available for food purchases. Government programs, such as food stamps and school lunch, could also directly affect the pattern of household food expenditures.

The stage in the family life cycle has been found to be an important variable in explaining consumer behavior. Traditional life-cycle analysis employs marital status, age of household head and spouse, and age of children as factors in establishing life-cycle categories. Low-income households, however, are not best described by the conventional life-cycle categories which focus primarily on families in which both husband and wife are present. About half of the low-income households have only females present.

Nine life-cycle stages were developed as independent variables and they are defined in table 4. The classification provides for some progression between stages and focuses on female heads of household with children and the aged, numerically important categories of low-income households.

Dependent Variables

The dependent variables are various categories of food expenditures. A priori, on the basis of Engel's Law, which holds that the lower the income the greater the percentage of outlay for food, it could be expected that food would account for a major portion of the total expenditures of low-income households. It would be desirable for policymakers to know how various low-income households allocate their food budgets to alternative dietary patterns.

Table 4--Stages in the life cycle

Male head of household:

1. age under 40, children present 1/
2. age under 40, no children 2/
3. age 40-64, children 1/
4. age 40-64, no children 2/
5. age 65 and over 1/

Female head of household:

6. age under 40, oldest child under 12
7. age under 40, oldest child 12 or older
8. age 40-64, children
9. age 65 and over

1/ Includes households with both male and female head present.

2/ Includes households with only female head present.

The dependent variables, expressed as weekly per capita monetary expenditures on the respective food categories, are defined as:

- (1) Total at-home food expenditures--includes all outlays by household members for food consumed at home.
- (2) Total food away from home--monetary outlay for all meals and snacks purchased and consumed away from home.
- (3) All meat--all meats, fish, poultry, and other meat products purchased and consumed at home.
- (4) Milk products--all dairy products except butter purchased and consumed at home.
- (5) Breads and cereals--all bread, bakery items, grain, and cereal products purchased and consumed at home.
- (6) Fruits and vegetables--fresh and processed fruits and vegetables purchased and consumed at home.
- (7) Sugar, sweets, fats, and miscellaneous foods--includes sugars, candies, syrup, fats and oils, including butter and oleomargarine, beverages, and other foods not included elsewhere purchased and consumed at home.

THE MODEL

This analysis used ordinary least squares to estimate relationships between food expenditure levels and selected household characteristics. An economic model is a simplified portrayal of the relationships and underlying forces that generate observable economic variables. By definition the theoretical model is much less complex than the real-world situation that it attempts to portray. The objective of this analysis is to specify quantitatively for each region the forces which determine the level of expenditure for all food and component food groups. Application of the same estimation technique to each of the regions provides a means of direct comparison of the parameter estimates.

The mathematical form of the model used is specified as follows for each of the component food group expenditure levels.

$$\begin{aligned}
 FE_i = & a + b_1 Y + b_2 HH + b_3 RES_1 + b_4 RES_2 + b_5 RAC_2 + b_6 RAC_3 + \\
 & b_7 RAC_4 + b_8 SL_1 + b_9 FS_1 + b_{10} ED_2 + b_{11} ED_3 + b_{12} EMP_1 + \\
 & b_{13} TEN_1 + b_{14} TEN_3 + b_{15} LC_2 + b_{16} LC_3 + b_{17} LC_4 + b_{18} LC_5 + \\
 & b_{19} LC_6 + b_{20} LC_7 + b_{21} LC_8 + b_{22} LC_9 + e_i
 \end{aligned}$$

where:

FE_i = per capita weekly expenditure for the i th food category in dollars.

Y = weekly income in dollars, including all sources of revenue plus food stamp bonus.

HH = number of persons in the household who eat at least ten meals at home weekly.

The remaining independent variables are all dummy variables representing various household characteristics.

RES₁ = residence in metropolitan area

RES₂ = residence in suburban area

RES₃ = residence in rural area*

RAC₁ = head of household is white*

RAC₂ = head of household is black

RAC₃ = head of household is Hispanic

RAC₄ = head of household is of other race

SL₁ = household member participates in National School Lunch Program

FS₁ = household participates in Food Stamp Program

ED₁ = head of household has completed 0-8 years of school*

ED₂ = head of household has completed 9-12 years of school

ED₃ = head of household has completed over 12 years of school

EMP₁ = head of household is employed

TEN₁ = residence is owned by the household

TEN₂ = residence is rented for cash by the household*

TEN₃ = residence is rented or used on a noncash basis by the household

LC₁ = life cycle 1; male head, age under 40, with children*

LC₂ = life cycle 2; female head, age under 40, oldest child 12 or less

LC₃ = life cycle 3; female head, age under 40, oldest child over 12

LC₄ = life cycle 4; male or female head, age under 40, no children

LC₅ = life cycle 5; male head, age 40-64, children

LC₆ = life cycle 6; female head, age 40-64, children

LC₇ = life cycle 7; male or female head, age 40-64, no children

LC₈ = life cycle 8; male head, age 65 or older

LC9 = life cycle 9; female head, age 65 or older

e_i = disturbance term

* = variable excluded to avoid singularity in the model

RESULTS OF THE ANALYSIS

The estimated coefficients from the regression analysis are shown in appendix tables 1-7. In general, the regression models explain between 10 and 60 percent of the variation in per capita food expenditures. Virtually of all the regression equations had highly significant F-ratios.

Most of the equations had significant and positive coefficients for income and negative coefficients for family size. The food group equations had significantly positive intercepts that were large relative to the magnitude of the coefficients for income and family size.

Table 5 shows the estimated marginal propensity to consume (MPC) food for households in the various regions. The values indicate the expected increase of food expenditures for each dollar increase in household weekly income.

In most regions, households spent relatively larger proportions of their added income on food away from home. This conforms to a general observation that away-from-home food expenditures are growing at a faster rate than other types of food expenditures in all income groups.

In general, higher MPCs existed for the various food groups in those regions where the level of household income was relatively low, indicating a greater inclination to expend additional funds for food by the poorer households.

Table 6 shows the estimated income elasticities for the various food groups, indicating the proportional increase in expenditure for food in response to a 1-percent increase in income. In general, the income elasticity of the foods were inelastic with proportionally small response to a 1-percent change in income. Notably the food away from home displayed relatively high income elasticities.

Food at Home

The regression coefficients for the national sample explained nearly a quarter of the total variation in food expenditures (app. table 1). The coefficient for the income variable and the family size variable were small relative to the size of the constant term. This phenomenon seems to be true for all regions, although the coefficient is highly significant statistically, the absolute value is small. This implies that for households in the low-income range, the per capita food expenditure increases only slightly with increases in income.

The coefficient for income varied from 0.014 to 0.050 and in almost all cases was significant at the 95-percent confidence level. This means that for a \$1.00 per week increase of income a household would increase per capita food expenditures by one to five cents per week. The indicated MPCs for a household of three persons are in the 5 to 15 cent range, whereas the average propensity to consume food for the overall sample was approximately 40 percent of income spent on food. The magnitudes of the income coefficients vary, within the largest coefficients in the north-central States and east south-central and Mountain

Table 5--Marginal propensity to consume selected foods;
average household by region 1/

Item	Region									National
	1 NE	2 MA	3 ENC	4 WNC	5 SA	6 ESC	7 WSC	8 M	9 P	

1/ Marginal propensity to consume measures the change in expenditures associated with a \$1.00 change in income.

2/ Subcategories do not sum to all food at home because alcoholic beverages are not included in miscellaneous foods.

* = regression coefficient significant at 0.05 level.

Table 6--Elasticity of income for selected food groups for average households by region

Item	Region											National
	1 NE	2 MA	3 ENC	4 WNC	5 SA	6 ESC	7 WSC	8 M	9 P			
All food at home	0.0979	0.268	0.162	0.374	0.258	0.352	0.283	0.163	0.353	0.266		
Meats	.239	.245	.071	.429	.393	.347	.251	.134	.263	.269		
Milk products	-.235	.353	.225	.073	.146	.169	.289	.380	.311	.219		
Fruits and vegetables	.123	.104	.138	.315	.221	.384	.369	.423	.169	.221		
Bread and cereals	.109	.511	.225	.435	.233	.343	.225	.150	.068	.317		
Misc. foods	.036	.219	.294	.422	.191	.394	.307	-.063	.540	.278		
Food away from home	-1.474	1.656	0.764	2.863	.871	1.539	1.937	2.122	1.410	1.516		

regions, and the lowest in New England and Mountain States. The highest MPC was in the north-central States and the lowest in the New England region.

The number of individuals in the household substantially influences per capita food expenditure, averaging between \$1.25 and \$2.40 less per week for each additional household member. Female headed households, except for the elderly (65 and older), generally spend less for food. Blacks, on average, have higher per capita food expenditures than whites or other ethnic groups. Both the School Lunch Program and the Food Stamp Program have a positive effect on food expenditures. Residents of central cities have higher food expenditures than rural or suburban households. Tenure and the level of education did not significantly affect food expenditures. Households without children spent between \$2.00 and \$4.30 more per capita than households with children.

Food Away from Home

In recent years the Nation's expenditures for away-from-home eating have become a major part of the household food budget. For low-income households, away-from-home eating outlays constitute over 10 percent of the total food expenditures.

Families with children spend more per capita for food away from home than other families. Households with a head 65 or older spent, on average, two to three dollars less per capita than other households. The School Lunch Program was positively related to away-from-home expenditures reflecting the presence of school-age children eating school meals and other snacks away from home.

On average, households in the Mid-Atlantic, Mountain, and Pacific coastal States had the highest per capita away-from-home food expenditures. Away-from-home expenditures are positively correlated with income and negatively correlated with household size. If the household head was employed, the household had a significantly higher average expenditure for away-from-home food. The effects of other household characteristics generally were either mixed across the regions or had relatively small absolute effect on the level of spending.

The highest marginal propensity to consume food away from home was in the west north-central and Mountain States, two relatively rural areas. The New England region exhibited a negative relationship to income, but this may be a result of the relatively small sample size in that region.

Meats

Meats are by far the largest expense item in the household food budget, nearly a third of the total food budget. The Mid-Atlantic and east north-central States had the highest per capita meat expenditures, while the west north-central and Mountain States had the lowest expenditures for meats.

Across nearly all regions meat purchases were significantly responsive to changes in income and family size. On average, blacks purchased more meats than other races.

The highest MPCs for meats were observed in the west north-central and the southern States, generally indicating a greater proclivity to purchase meats. Low meat expenditures, relative to the average expenditures in other regions, were observed in the east north-central and Mountain regions.

Dairy Products

The overall national average per capita expenditure for milk products was about \$4.50 per week. The New England, Mid-Atlantic, and Mountain States had the highest average milk expenditures. The lowest expenditures in the national sample were observed in the southern regions.

Blacks and other ethnic groups tended to purchase fewer milk products than white families. Families with children had higher expenditures for milk products. Both the School Lunch Program and the Food Stamp Program had a positive effect on milk product expenditures. The level of education also affected milk product expenditures; more highly educated household heads tended to spend more for milk products.

The highest marginal propensity to consume milk occurred in households in the Mid-Atlantic and Mountain States. The lowest propensities to consume milk products were recorded in the west north-central and south Atlantic States.

Fruits and Vegetables

The western States had the highest average expenditures for fruits and vegetables, due in part to the greater availability of produce in these regions. The lowest average fruit and vegetable expenditures were observed in the west north-central and southern States.

The level of education was positively related to level of expenditure for fruits and vegetables. The elderly, on average, purchased greater quantities of fruits and vegetables than households with younger heads.

The high marginal propensities to consume fruits and vegetables were observed in the regions that had the lowest average per capita expenditures, the west north-central and southern regions. Conversely, the regions with the highest average expenditure levels, the Northeast and West, had relatively low income coefficients.

Breads and Cereals

On the average, low-income households spent \$4.88 per capita weekly for bread and cereal products. The highest average was recorded in the Northeast and the lowest in the west north-central and southern States.

The Mid-Atlantic and west north-central States had households with the highest marginal propensity to consume breads and cereals and the lowest were observed in the Mountain and Pacific States.

Sugars, Fats, and Other Foods

This category of foods encompasses all foods that are not counted in the other food groups. It includes all sugars and sweets, fats and oils, nonalcoholic beverages, condiments, soups and sauces, baby food, and mixed foods, such as TV dinners or other mixed dishes.

Low-income families spent approximately \$7.00 a week for these foods. The highest average expenditures were observed in New England and the Mid-Atlantic States and lowest average expenditures in the South Atlantic and west

south-central States. Expenditures for sugars and fats seemed to be relatively stable over the regions and the major variations in this category were due to differences in expenditures for miscellaneous foods.

Blacks and Hispanics, on average, spent less for foods in this category. Households without children had a higher average expenditure level than those with children. School lunch, food stamps, and education level had a positive effect on the expenditure level for this category of foods.

The coefficients for income were highest in the Pacific, west north-central, and east south-central States. The lowest income coefficients were observed in the Mountain and New England States, although in both cases the estimated coefficients were not statistically significant.

IMPLICATIONS OF THE STUDY

Regression analyses of the Nationwide Food Consumption Survey data indicate that there are significant regional differences in food expenditure patterns of low-income households. The analyses also suggest that socioeconomic characteristics of the households affect food expenditure patterns. Income and household size, in almost all cases, were predominant factors influencing the level of household expenditure for food and the various subcategories of food.

Race, participation in one of the national food assistance programs, and life-cycle variables seem to be the most important explanatory factors in analyzing low-income household food expenditures.

Recent sociological observations indicate that regional differences in consumer behavior have been mitigated by advances in transportation, communication, and marketing. The results of this study suggest that significant differences still exist in expenditure patterns among regions of the country. Although a substantial amount of the variation among regions is explained by differences in household characteristics, the absolute differences in the various coefficients indicate that regional differences continue to influence consumer expenditure patterns.

These results could be of some interest to commercial food marketing firms. Because low-income households have substantially less than a proportionate share of total sales within a large geographic region, the implications for commercial food marketing firms are somewhat limited. There are, however, some situations where commercial firms operating in a localized area can tailor their marketing policies to accommodate the preferences of low-income clientele.

These findings should be useful to policymakers in their efforts to estimate the effect of food assistance programs on low-income household food expenditure patterns. The estimated coefficients project probable allocation of income for various food categories for all regions of the country. The findings suggest that efforts to improve nutrition could focus on regional considerations rather than nationally applied standards.

There are, however, several considerations that must be mentioned with respect to the results of this analysis. The regional regression models, in most cases, explained less than 50 percent of the total variation, indicating that there is substantial variability within each region that is not explained by the model. There may be household characteristics and economic variables not included

in this analysis that may account for the observed regional differences. More detailed data on household characteristics and perhaps more rigorous analytic tools would provide a much sounder basis for identifying and measuring regional differences in food expenditures.

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Appendix table 1--Estimated regression coefficients: All food at home, weekly expenditure per capita, by region

Independent variable	Region									National
	1 NE	2 MA	3 ENC	4 WNC	5 SA	6 ESC	7 WSC	8 M	9 P	
Intercept	18.029*	14.991*	14.365*	14.955*	14.180*	13.324*	12.605*	16.306*	16.709*	14.206*
	(5.0)	(9.2)	(8.7)	(4.8)	(18.2)	(16.2)	(16.4)	(5.8)	(5.3)	(28.3)
Income & bonus food stamps	.014	.035*	.021*	.051*	.033*	.046*	.039*	.018	.044*	.035*
	(.9)	(5.9)	(2.3)	(3.7)	(9.6)	(9.6)	(8.9)	(1.5)	(3.3)	(15.1)
Family size	-1.346*	-1.577*	-1.931*	-1.588*	-1.526*	-1.251*	-1.269*	-1.272*	-2.393*	-1.708*
	(-2.0)	(-7.5)	(-6.2)	(-3.3)	(-13.4)	(-8.9)	(-10.4)	(-3.4)	(-4.1)	(-21.7)
Central city	1.421	-.842	6.502*	.020	.550	.787	.615	.291	.665	1.578*
	(.9)	(-1.0)	(6.6)	(.1)	(1.6)	(1.7)	(1.5)	(.3)	(.4)	(6.4)
Suburban	1.965	-1.711*	-.634	8.657*	-.693	.260	-.973*	-3.815*	.715	-.303
	(1.1)	(-2.2)	(-.7)	(2.0)	(-1.7)	(.6)	(2.7)	(2.4)	(.5)	(-1.3)
Black	2.752	1.162	.999	-.669	.281	.180	.961*	-2.716	7.376*	2.053*
	(.7)	(1.3)	(1.3)	(-.3)	(.8)	(.4)	(2.7)	(-1.5)	(5.4)	(9.2)
Hispanic	-.711	.467	-2.729	-4.279	-1.300	-1.186	-.247	-3.481*	-.260	.014
	(-.2)	(.4)	(-1.6)	(-.9)	(-.8)	(-.7)	(-.4)	(-2.5)	(-.1)	(.1)
Other race	-3.818	-.153	-5.889*	-2.497	2.792	-.853	.733	-.930	-4.907	-1.660*
	(-3)	(-.2)	(-3.0)	(-.5)	(.8)	(-.4)	(.3)	(-.5)	(-1.8)	(-2.3)
School lunch	2.372	-1.968*	2.493*	1.425	.765	.508	-.157	3.490*	.830	1.440*
	(1.3)	(-2.1)	(2.4)	(0.8)	(1.7)	(1.0)	(-.3)	(2.6)	(0.4)	(5.3)
Food stamp	.637	-.298	.974	.032	1.033*	.841*	1.522*	1.178	2.417	1.117*
	(.5)	(-.4)	(1.36)	(.1)	(3.3)	(2.2)	(4.8)	(1.0)	(1.9)	(5.7)
High school	-2.927	1.775*	-.146	-2.764	-.003	-.048	-.246	-.490	-1.449	.137
	(-1.4)	(2.8)	(-.2)	(-1.8)	(-.1)	(-.1)	(-.7)	(-.4)	(-1.0)	(-.6)
College	-3.773	5.706*	6.693*	-5.664*	-.406	-.317	-.042	.953	-4.742*	.933*
	(-1.7)	(2.3)	(6.3)	(-2.5)	(-.8)	(-.3)	(-.1)	(.6)	(-2.8)	(3.1)
Employed	1.445	-.781	-.021	1.326	.448	.186	.171	.203	3.807*	-.521*
	(1.1)	(-.8)	(-.1)	(1.1)	(1.2)	(.4)	(.5)	(.2)	(2.6)	(-2.2)
Own home	1.201	1.775*	3.265*	-2.595	-.225	-.875*	.780*	-1.794	-1.237	.696*
	(.7)	(2.8)	(3.9)	(-1.7)	(-.7)	(2.1)	(2.4)	(-1.4)	(-.9)	(3.2)
Noncash rent	3.295	5.706*	-4.517	-1.272	-.453*	-.381	-.450	-5.107	-11.415*	-.725
	(.7)	(2.3)	(-2.8)	(-.5)	(-.6)	(-.5)	(.7)	(-1.8)	(-4.9)	(-1.6)
Life cycle 2	.841	-.781	-2.205	-.503	.999	-.408	.410	1.200	1.475	-.856*
	(.4)	(-.8)	(-1.8)	(-.2)	(1.7)	(-.6)	(.6)	(.7)	(-.6)	(-2.3)
Life cycle 3	2.020	.549	-1.560	1.511	1.526	.191	.263	3.787	-1.395	.357
	(.4)	(.3)	(-.8)	(.3)	(1.6)	(.1)	(.2)	(1.1)	(-.4)	(.5)
Life cycle 4	-1.756	5.474*	.362	5.666	4.712*	3.408*	3.992*	3.803	12.077*	4.302*
	(-.8)	(3.6)	(.2)	(1.6)	(4.9)	(3.1)	(3.2)	(1.9)	(4.7)	(9.3)
Life cycle 5	-1.463	.825	2.858*	2.249	1.652*	-2.234*	.157	1.399	3.513	1.369*
	(-.5)	(1.0)	(2.2)	(1.2)	(3.0)	(-3.5)	(.3)	(.8)	(1.7)	(3.9)
Life cycle 6	2.358	-.420	1.343	-.849	1.179	1.641*	-1.059	-.244	-2.012	-.949*
	(.7)	(-.4)	(.9)	(-.3)	(1.8)	(2.2)	(-1.6)	(-.1)	(-.5)	(2.3)
Life cycle 7	.592	.726	2.376	4.450*	2.829*	.583	.756	9.557*	-.218	2.027*
	(.2)	(.5)	(1.6)	(2.1)	(4.6)	(.8)	(1.1)	(4.3)	(-.1)	(4.9)
Life cycle 8	.408	1.304	-1.206	.506	-.676	-.357	1.043	1.588	.747	-.803
	(.1)	(.9)	(-.8)	(.2)	(-1.1)	(-.5)	(1.7)	(.6)	(.2)	(-1.9)
Life cycle 9	-3.698	.990	5.183*	1.838	-.089	1.172	2.363*	1.043	2.776	2.300*
	(-1.1)	(.7)	(3.4)	(.7)	(-.1)	(1.5)	(3.6)	(.5)	(1.2)	(5.3)
R ²	.401	.312	.555	.465	.253	.235	.240	.512	.465	.244
F-ratio	1.49	7.80	26.61	3.16	18.16	10.27	16.32	4.53	10.33	67.47

* = Significant at 0.05 level.

t ratios in parentheses.

Appendix table 2--Estimated regression coefficients: Food away from home; weekly expenditure per capita, by region

Independent variable	Region									National
	1	2	3	4	5	6	7	8	9	
	NE	MA	ENC	WNC	SA	ESC	WSC	M	P	
Intercept	0.499 (.1)	1.070 (.7)	2.217* (2.1)	2.321 (.6)	4.513* (5.4)	4.630* (5.3)	2.964* (3.7)	6.067 (1.5)	3.292 (1.7)	3.724* (9.0)
Income & bonus food stamps	-.017 (-.7)	.025* (4.2)	.010 (1.6)	.041* (2.3)	.014* (3.8)	.024* (4.7)	.025* (5.4)	.034* (2.0)	.023* (2.9)	.023* (11.8)
Family size	.122 (.1)	-.824* (-4.0)	-.243 (-1.2)	-.106 (-.2)	-.305* (-2.5)	-.489* (-3.3)	-.477* (-3.7)	-.747 (-1.4)	-.638 (-1.8)	-.643* (-9.8)
Central city	3.598 (1.6)	1.399 (1.7)	-.693 (-1.1)	2.137 (1.2)	1.200* (3.1)	.029 (.1)	-1.107* (-2.5)	1.003 (.6)	.733 (.8)	.508* (2.5)
Suburban	4.906 (1.8)	2.863* (3.8)	.242 (.4)	8.595 (1.5)	.258 (.5)	-1.047* (-2.2)	.110 (.3)	2.404 (1.0)	1.332 (1.5)	.392* (2.0)
Black	-2.595 (-.4)	2.957* (3.3)	-.866 (-1.6)	1.591 (.6)	-.942* (-2.6)	1.097* (2.6)	.953* (2.5)	1.321 (.5)	.943 (1.1)	-.127 (-.7)
Hispanic	-5.609 (-.8)	4.526* (4.5)	6.072* (5.5)	-1.680 (-.3)	-5.521 (-3.1)	.826 (.5)	.270 (.4)	-.682 (-.3)	-.473 (-.4)	1.837* (5.4)
Other race	-13.656 (-.6)	-2.876 (-.8)	1.579 (1.2)	3.182 (.5)	.304 (.8)	8.215* (3.5)	-1.572 (.6)	-.410 (.2)	-4.108* (2.5)	-1.272* (2.1)
School lunch	8.556* (3.2)	4.771* (7.5)	1.032 (1.5)	4.365 (1.8)	1.015* (2.1)	1.548* (2.9)	1.184* (2.2)	2.139 (1.1)	.190 (.2)	2.731* (12.1)
Food stamp	-.025 (-.1)	.083 (.2)	.082 (.2)	-1.270 (-.6)	-1.023* (-3.0)	-.881* (-2.1)	.514 (1.5)	-.644 (-.4)	-1.853 (-2.4)	-.509* (-3.1)
High school	4.340 (1.4)	-.172 (-.3)	.497 (1.1)	-2.029 (-1.3)	1.128* (3.0)	.665 (1.6)	-.234 (-.7)	-1.683 (-.9)	-.413 (-.5)	.182 (1.0)
College	-1.469 (-.4)	-.041 (-.1)	1.301 (1.8)	-3.962 (-1.4)	-.007 (-.1)	.027 (-.1)	-.215 (-.3)	.999 (.4)	.358 (.4)	-.267 (-1.1)
Employed	.985 (.5)	1.932* (2.6)	2.772* (4.4)	1.187 (.7)	.721 (1.7)	-.325 (.7)	.861* (2.2)	.626 (.4)	1.970* (2.2)	.879* (4.4)
Own home	3.516 (1.3)	1.803* (2.9)	.426 (.8)	2.124 (1.1)	.733* (2.0)	.231 (.5)	.699* (2.0)	-2.930 (-1.6)	-.751 (-.9)	.655* (3.5)
Noncash rent	6.675 (1.0)	2.631 (1.1)	.225 (.2)	1.837 (.6)	-.082 (-.1)	1.539 (1.7)	-.159 (-.2)	-11.369* (-2.7)	-3.220* (-2.3)	.369 (1.0)
Life cycle 2	-1.850 (-.6)	.349 (.4)	-.777 (-1.0)	6.624 (1.9)	-1.036 (-1.6)	-3.136* (-4.2)	-1.962* (-2.8)	1.926 (.8)	-1.090 (-.8)	-.531 (-1.7)
Life cycle 3	-12.861 (-1.8)	-4.673* (-2.2)	1.755 (1.4)	-1.848 (.3)	1.295 (1.3)	-.309 (-.2)	-1.087 (-.8)	-3.316 (-.7)	3.407 (1.6)	-1.210* (-2.2)
Life cycle 4	.232 (.1)	2.296 (1.5)	2.910* (2.8)	5.333 (1.2)	2.418* (2.3)	4.063* (3.4)	-3.157* (-2.4)	-5.072 (-1.8)	1.266 (.8)	.808* (2.1)
Life cycle 5	7.274 (1.6)	-3.488* (-4.4)	-.465 (.5)	5.196* (2.2)	-1.375* (-2.2)	-2.915* (-4.3)	-1.636* (-2.7)	1.938 (.8)	2.162 (1.7)	1.637* (5.6)
Life cycle 6	1.912 (.4)	-4.858* (-5.0)	-.299 (-.3)	-.755 (-.2)	1.028 (1.4)	.067 (.1)	-1.115 (-1.6)	-3.028 (-.8)	1.624 (.7)	-1.325* (-3.8)
Life cycle 7	-3.540 (-.9)	-2.733* (-2.1)	-.903 (-.9)	-2.019 (-.7)	-2.595* (-3.9)	-3.113* (-3.9)	-.977 (-1.4)	5.535 (1.7)	-2.001 (-1.3)	-2.105* (-6.1)
Life cycle 8	4.802 (1.1)	-3.295* (-2.4)	-2.105* (-2.1)	-3.136 (-1.1)	-3.979* (-5.8)	-3.652* (-4.8)	-2.028* (-3.1)	-3.330 (-.9)	-2.946 (-1.6)	-3.135* (-8.9)
Life cycle 9	5.724 (1.1)	-3.473* (-2.5)	-.627 (-.6)	-1.417 (-.4)	-3.377 (-4.4)	-4.365 (-5.4)	-2.844 (-4.1)	.101 (.1)	-2.711 (-1.9)	-2.692* (-7.4)
R ²	.483	.450	.309	.273	.231	.240	.130	.327	.196	.175
F-ratio	2.08	14.06	9.55	1.37	16.08	10.59	7.89	2.10	2.89	44.09

* = Significant at 0.05 level.

t ratio in parentheses

Appendix table 3--Estimated regression coefficients: All meat products, weekly expenditure per capita, by region

Independent variable	Region										National
	1	2	3	4	5	6	7	8	9		
	NE	MA	ENC	WNC	SA	ESC	WSC	M	P		
Intercept	5.582*	5.848*	5.310*	6.939*	4.269*	4.000*	5.204*	6.058*	4.780*	4.702*	
	(2.7)	(7.0)	(6.6)	(4.1)	(9.9)	(8.8)	(11.5)	(3.8)	(4.8)	(20.1)	
Income & bonus	.011	.013*	.004	.022*	.021*	.019*	.015*	.005	.012*	.014*	
food stamps	(1.6)	(4.3)	(.8)	(2.9)	(10.9)	(7.0)	(5.6)	(.8)	(2.1)	(13.2)	
Family size	-.101	-.647*	-.616*	-.524*	-.767*	-.517*	-.531*	-.549*	-.857*	-.658*	
	(-.3)	(-6.0)	(-4.1)	(-2.0)	(-12.2)	(-6.7)	(-7.4)	(-2.6)	(-4.6)	(-17.7)	
Central city	-.428	1.036*	2.271*	-.079	-.004	.627*	1.033*	-1.468*	-.591	.436*	
	(-.5)	(2.4)	(4.8)	(-.1)	(-.1)	(2.4)	(4.2)	(-2.2)	(-1.2)	(3.8)	
Suburban	.053	-.020	-.222	-2.031	-.583*	.276	-.433*	-.716	-.531	-.315	
	(.1)	(-.1)	(-.5)	(-1.8)	(-2.6)	(1.1)	(-2.0)	(-.8)	(-1.2)	(-.3)	
Black	-2.320	3.217*	2.081*	2.155	1.803*	1.452*	1.165*	1.387	4.648*	2.547*	
	(-1.0)	(6.9)	(5.4)	(1.9)	(9.8)	(6.6)	(5.6)	(1.3)	10.9	(24.1)	
Hispanic	-2.591	.819	.322	-.517	.529	.356	-.049	1.019	1.728*	.630*	
	(-1.0)	(1.6)	(.1)	(-.2)	(.6)	(.4)	(-.1)	(1.3)	(3.2)	(3.3)	
Other race	-3.723	1.707	-2.494*	-2.201	3.182	.665	.622	-4.132*	1.206	-.434	
	(-1.4)	(1.4)	(-2.6)	(.8)	(1.7)	(.5)	(.5)	(-4.2)	(1.4)	(-1.3)	
School lunch	-.735	.385	.263	.467	1.058*	.051	-.353	1.122	1.044	.395*	
	(-.7)	(1.2)	(.8)	(.5)	(4.3)	(.2)	(-1.2)	(1.5)	(1.7)	(3.1)	
Food stamp	.988	-.508	.223	-.118	.422*	.812*	.953*	.569	1.148*	.389*	
	(1.4)	(-1.7)	(.6)	(-.1)	(2.4)	(3.8)	(5.1)	(.9)	(2.9)	(4.2)	
High school	-1.738	.071	1.756*	-1.755*	-.339	-.017	-.760*	-.625	.078	.022	
	(-1.4)	(.2)	(3.4)	(-2.6)	(-1.8)	(-.1)	(-3.8)	-.9	(.2)	(.2)	
College	-2.608*	-2.121*	-.887	-2.855*	-.688*	-.615	-1.079*	.062	.496	-.079	
	(-2.0)	(-4.4)	(-1.9)	(-2.3)	(-2.4)	(-1.2)	(-2.8)	(.1)	(.9)	(-.5)	
Employed	-.344	.425	.976*	.013	-.132	.665*	.819*	.817	.645	.162	
	(-.5)	(1.1)	(2.4)	(.1)	(-.6)	(2.7)	(3.8)	(1.4)	(1.4)	(1.4)	
Own home	-1.340	.482	-.316	-1.802*	.568*	-.137	.157	1.023	-.328	.242*	
	(-1.3)	(1.5)	(-.4)	(-2.1)	(3.1)	(-.6)	(.8)	(1.4)	(-.8)	(2.3)	
Noncash rent	1.799	.961	-1.092	-.755	.671	.935*	-.676	-1.683	-.915	.099	
	(.7)	(.7)	(-1.9)	(-.6)	(1.5)	(2.0)	(-1.9)	(-1.0)	(-1.3)	(.5)	
Life cycle 2	.026	.065	.452	-2.618	.135	.230	.014	.843	-.550	-.315	
	(.1)	(.2)	(.5)	(-1.8)	(.4)	(.6)	(.1)	(.9)	(-.8)	(-1.8)	
Life cycle 3	6.359*	.833	.452	-2.159	.108	.033	.362	.342	.518	.555	
	(2.3)	(.8)	(.5)	(-.8)	(.2)	(.1)	(.5)	(.2)	(.4)	(1.8)	
Life cycle 4	-.530	-.908	-.345	.191	1.963*	1.536*	1.139	-.343	-.510	-.256	
	(-.4)	(-1.1)	(-.4)	(-.1)	(3.7)	(2.5)	(1.6)	(-.3)	(-.6)	(-1.2)	
Life cycle 5	3.340	.288	.544	-.425	1.156*	-.683	.209	.645	1.953*	.850*	
	(1.9)	(.7)	(.8)	(-.4)	(3.8)	(-1.9)	(.6)	(.7)	(2.9)	(5.2)	
Life cycle 6	.823	.619	.704	-1.081	.337	.809*	-.668	-.327	-.626	.109	
	(.4)	(1.2)	(.9)	(-.6)	(.9)	(2.0)	(-1.7)	(-.2)	(-.5)	(.5)	
Life cycle 7	2.434	1.053	.614	1.754	1.852*	.552	.718	.699	.393	1.223*	
	(1.5)	(1.6)	(.9)	(1.5)	(5.4)	(1.3)	(1.8)	(.6)	(.5)	(6.2)	
Life cycle 8	1.426	1.986*	-.277	.159	-.516	-.040	.461	1.378	.263	-.103	
	(.8)	(2.8)	(-.3)	(.1)	(-1.5)	(.1)	(1.2)	.9	(.3)	(.5)	
Life cycle 9	-1.865	.863	2.940*	-.542	-.389	.757	.794*	.686	1.393	1.169*	
	(-.9)	(1.2)	(3.9)	(-.4)	(-1.0)	(1.8)	(2.1)	(.6)	(1.9)	(5.7)	
R ²	.479	.352	.521	.466	.319	.242	.243	.451	.492	.256	
F-ratio	2.05	9.35	23.17	3.18	25.18	10.72	16.92	3.55	11.50	71.95	

* = Significant at 0.05 level.

t ratio in parentheses

Appendix table 4--Estimated regression coefficients: All milk products, weekly expenditure per capita, by region

Independent variable	Region										National
	1	2	3	4	5	6	7	8	9		
	NE	MA	ENC	WNC	SA	ESC	WSC	M	P		
Intercept	2.868*	1.298*	1.241*	1.928*	1.818*	1.932*	1.506*	1.210*	1.154*	1.636*	
	(3.9)	(3.8)	(3.5)	(3.4)	(11.9)	(10.8)	(8.8)	(2.1)	(2.0)	(17.1)	
Income & bonus food stamps	-.005	.006*	.003	.001	.002*	.003*	.005*	.006*	.005*	.003*	
	(-1.5)	(4.5)	(1.7)	(.5)	(3.1)	(2.5)	(4.5)	(2.2)	(2.0)	(7.2)	
Family size	-.135	-.314*	-.205*	-.142	-.091*	-.051	-.105*	-.120	-.278*	-.176*	
	(-1.0)	(-7.1)	(-3.0)	(-1.6)	(-4.1)	(-1.7)	(-3.9)	(-1.6)	(-2.6)	(-11.6)	
Central city	.001	.255	.771*	.016	-.089	-.074	-.057	-.004	.232	.125*	
	(.1)	(1.4)	(3.6)	(.1)	(-1.3)	(-.7)	(-.6)	(-.1)	(.8)	(2.6)	
Suburban	.186	.198	.001	2.144*	.029	.084	.124	-.479	.597*	.034	
	(.5)	(1.2)	(.1)	(2.7)	(.4)	(.9)	(1.6)	(-1.5)	(2.2)	(.7)	
Black	1.421	-.274	-.402*	-.216	-.423*	-.487*	-.286*	-.225	-.255	-.341*	
	(1.7)	(-1.4)	(-2.3)	(-.6)	(-6.4)	(-5.6)	(-3.6)	(-.6)	(-1.0)	(-7.8)	
Hispanic	1.874*	-.222	-1.068*	-.990	-.054	-.169	-.168	-.258	-.256	-.205*	
	(2.0)	(-1.0)	(-3.0)	(-1.1)	(-.2)	(-.4)	(-1.2)	(-.9)	-.8	(-2.6)	
Other race	.092	1.141*	-1.142*	.641	.105	-.572	.209	1.020*	-2.721*	-.933*	
	(.1)	(-2.2)	(-2.7)	(.7)	(.2)	(-1.2)	(.4)	(2.9)	(-5.4)	(-6.7)	
School lunch	.808*	.664*	.259	.552	-.007	.161	-.147	.007	.543	.244*	
	(2.2)	(4.9)	(1.2)	(1.6)	(-.1)	(1.5)	(-1.3)	(.1)	(1.5)	(4.6)	
Food stamp	-.218	.350*	.062	.234	-.012	.003	.041	.251	.304	.139*	
	(-.9)	(2.9)	(.4)	(.9)	(.2)	(.1)	(.6)	(1.1)	(1.3)	(3.7)	
High school	.076	.117	.190	.141	.271*	-.150	.286*	.307	.376	.176*	
	(.2)	(.9)	(1.2)	(.6)	(3.9)	(-1.7)	(3.8)	(1.2)	(1.5)	(4.2)	
College	.200	.374	1.925*	.087	1.871	-.003	.511*	.543	.371	.604*	
	(.4)	(1.9)	(8.4)	(.2)	(1.8)	(-.1)	(3.5)	(1.7)	(1.2)	(10.2)	
Employed	.308	.535*	.216	.049	-.089	.043	-.296*	.431*	1.052*	.127*	
	(1.2)	(3.4)	(1.0)	(.2)	(-1.1)	(.4)	(-3.6)	(2.0)	(3.9)	(2.7)	
Own home	.625	-.062	.543*	-.374	-.197*	.122	.094	-.249	-.211	.025	
	(1.7)	(-.5)	(3.0)	(-1.3)	(-3.0)	(1.4)	(1.3)	(-1.0)	(-.8)	(.6)	
Noncash rent	-.623	.861	-.290	-.384	-.077	-.388*	.336*	1.712*	-1.586*	.007	
	(-.7)	(1.6)	(-.8)	(-.9)	(.6)	(-2.1)	(2.5)	(2.9)	(-3.7)	(.1)	
Life cycle 2	.358	-.054	-.028	-.413	.277	-.139	.215	.253	-.058	.033	
	(.8)	(-.3)	(-.1)	(-.8)	(1.5)	(.9)	(1.4)	(.8)	(-.1)	(.4)	
Life cycle 3	-2.147*	1.498	-.732	-1.056	.277	-.175	.059	.120	-.751	.073	
	(-2.2)	(.3)	(-1.7)	(-1.1)	(1.5)	(.6)	(.2)	(.2)	(-1.1)	(.6)	
Life cycle 4	-.963*	-.403	.408	-.045	-.657*	.336	.301	-1.131*	.984*	.035	
	(2.2)	(-1.3)	(1.2)	(-.1)	(-3.5)	(1.4)	(1.1)	(-2.8)	(2.1)	(.4)	
Life cycle 5	-1.358*	.905*	.340	-.211	.045	-.339*	.115	-.129	.645	.326*	
	(2.2)	(5.3)	(1.2)	(.6)	(.4)	(-2.4)	(.9)	(-.4)	(1.7)	(4.8)	
Life cycle 6	.617	-.079	.892	-.882	.403	-.029	.009	.224	-.133	.079	
	(.9)	(-.4)	(2.7)	(-1.5)	(3.1)	(-.2)	(.1)	(.4)	(-.2)	(1.0)	
Life cycle 7	-.710	.024	.004	.368	.049	.100	-.260	-.060	-.145	-.039	
	(-1.2)	(.1)	(.1)	(9.9)	(.4)	(.6)	(-1.7)	(.2)	(-.3)	(-.5)	
Life cycle 8	-.774	-.271	-.317	-.312	-.165	-.311*	.053	-.444	.478	-.187*	
	(-1.2)	(-.9)	(-.9)	(-.8)	(-1.3)	(-2.0)	(.4)	(-.8)	(.8)	(2.3)	
Life cycle 9	-.152	-.204	.547	.154	.089	.146	.240	.439	.590	.350*	
	(-.2)	(-.7)	(1.6)	(.3)	(.6)	(.9)	(1.6)	(1.0)	(1.3)	(4.2)	
R ²	.466	.373	.335	.326	.114	.123	.128	.386	.248	.108	
F-ratio	1.94	10.22	10.72	1.76	6.86	4.71	7.70	2.72	3.91	25.33	

* = Significant at 0.05 level.

t ratio in parentheses

Appendix table 5--Estimated regression coefficients: Bread and cereal products,
weekly expenditure per capita, by region

Independent variable	Region									National
	1	2	3	4	5	6	7	8	9	
	NE	MA	ENC	WNC	SA	ESC	WSC	M	P	
Intercept	2.619*	1.758*	1.232*	1.170*	1.933*	1.935*	1.515*	2.880*	2.880*	1.776*
	(3.4)	(6.0)	(3.4)	(2.0)	(12.0)	(11.6)	(10.0)	(4.9)	(6.5)	(18.7)
Income & bonus food stamps	.002	.008*	.004	.007*	.004*	.006*	.004*	.002	.001	.005*
	(.6)	(7.8)	(1.7)	(2.9)	(5.2)	(5.9)	(4.4)	(.8)	(.6)	(11.7)
Family size	-.389*	-.226*	-.208*	-.186*	-.144*	-.144*	-.098*	-.183*	-.013	-.193*
	(-2.7)	(-5.9)	(-3.0)	(-2.1)	(-6.1)	(-5.1)	(-4.1)	(-2.4)	(-.2)	(-12.8)
Central city	.756*	.498*	.960*	-.269	-.074	.266*	.005	-.539*	.022	.278*
	(2.3)	(3.2)	(4.5)	(-1.0)	(-1.0)	(2.8)	(.1)	(-2.2)	(.1)	(5.9)
Suburban	.824*	.072	-.050	1.490	-.052	-.379*	-.142*	-.737*	.212	-.066
	(2.0)	(.5)	(-.3)	(1.9)	(-.6)	(4.2)	(-2.0)	(-2.2)	(1.6)	(-1.4)
Black	1.850*	-.624*	.013	-.721	-.163*	-.246*	.050	-.401	.359	.047
	(2.1)	(-3.8)	(.1)	(-1.9)	(-2.4)	(-3.0)	(.7)	(-1.1)	(1.9)	(1.1)
Hispanic	.063	-.284	-.460	-.838	.049	-.099	.052	.129	-.078	.059
	(.1)	(-1.5)	(-1.3)	(-1.0)	(.1)	(-.3)	(.4)	(.5)	(-.3)	(.8)
Other race	1.218	.647	-1.224*	-.070	-.101	-.023	.298	1.803*	-1.117*	-.220
	(.4)	(1.5)	(-2.8)	(-.1)	(-.1)	(-.5)	(.7)	(2.2)	(-3.0)	(-1.6)
School lunch	1.078*	.375*	.414	.473	-.038	.133	.272*	.448	-.324	.271*
	(2.7)	(3.2)	(1.8)	(1.4)	(-.4)	(1.3)	(2.7)	(-1.9)	(-1.2)	(5.2)
Food stamp	-.088	-.003	.075	.166	.154*	-.024	.117	-.795	.214	.157*
	(-.3)	(-.1)	(.5)	(.6)	(2.4)	(-.3)	(1.8)	(-1.3)	(1.2)	(4.2)
High school	-.258	-.342*	-.105	.005	-.135	-.116	.050	-.228	-1.174*	-.154*
	(-.6)	(-3.0)	(-.7)	(.1)	(-1.9)	(-1.4)	(.7)	(-.7)	(6.0)	(3.6)
College	-.908	-.221	1.892*	.009	-.444	-.206	-.069	.503	-.761	.129*
	(-1.8)	(-1.3)	(8.1)	(.1)	(-4.2)	(-1.1)	(-.5)	(.7)	(-3.3)	(2.2)
Employed	.276	-.493*	.415*	-.024	.207*	.080	-.215*	-1.246	-.799	-.120*
	(1.0)	(-3.6)	(2.0)	(-.1)	(2.6)	(.9)	(-3.0)	(-3.0)	(-.4)	(-2.6)
Own home	1.096*	.590*	.723*	-.270	.100	-.004	-.077	-.349	-.806	.227*
	(2.8)	(5.1)	(4.0)	(-1.0)	(1.4)	(-.1)	(-1.2)	(-1.0)	(-4.2)	(5.4)
Noncash rent	.553	1.429*	.511	-.123	-.209	-.229	-.180	-.289	-1.261	-.011
	(.6)	(3.1)	(1.4)	(.3)	(-1.3)	(-1.3)	(-1.5)	(-.6)	(-3.9)	(.1)
Life cycle 2	1.085	.143	-.305	.366	.333*	.164	-.045	-.657	.301	-.015
	(.2)	(.8)	(-1.2)	(.7)	(2.6)	(1.2)	(-.3)	(-1.4)	(.9)	(-.2)
Life cycle 3	-2.253*	.201	.920*	.247	.701*	.247	-.006	.503	.603	-.005
	(2.2)	(.5)	(2.1)	(.3)	(3.6)	(.8)	(-.1)	(.7)	(1.2)	(-.1)
Life cycle 4	-.699	.348	-.783*	.009	-.266	-.584*	1.205*	-1.246	.371	-.222*
	(-1.5)	(1.3)	(-2.2)	(.1)	(1.3)	(-2.6)	(4.9)	(-3.0)	(1.0)	(-2.5)
Life cycle 5	-1.996*	-.184	.358	.277	-.097	-.295*	-.112	-.349	.168	-.099
	(-3.0)	(-1.3)	(1.2)	(.8)	(-.8)	(-2.3)	(-1.0)	(-1.0)	(.6)	(-1.5)
Life cycle 6	.382	-.114	-.022	-.102	.128	-.035	-.234	-.289	-.392	-.300*
	(.6)	(-.6)	(-.1)	(-.2)	(.9)	(-.2)	(-1.8)	(-.6)	(-.7)	(-3.7)
Life cycle 7	-.849	-.194	.592	.506	-.089	-.077	-.103	-.657	-.641	-.084
	(-1.4)	(-.8)	(1.8)	(1.3)	(-.7)	(-.5)	(-.7)	(-1.4)	(-1.9)	(-1.1)
Life cycle 8	.007	-.659	1.044	.780	-.450	-.227	.218	-.146	-.042	-.393*
	(.1)	(-2.6)	(.3)	(1.9)	(-3.4)	(-1.6)	(1.8)	(-.3)	(.1)	(-4.8)
Life cycle 9	.255	-.527*	.748*	1.186*	-.003	-.138	.253	-.801	.440	.239*
	(.3)	(2.0)	(2.2)	(2.6)	(-.1)	(-.9)	(1.9)	(-1.8)	(1.3)	(2.9)
R ²	.557	.350	.409	.432	.116	.163	.089	.397	.374	.100
F-ratio	2.80	9.24	14.76	2.77	7.01	6.51	5.11	2.85	7.08	23.19

* = Significant at 0.05 level.

t-ratio in parentheses



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Appendix table 6--Estimated regression coefficients: Fruits and vegetables,
weekly expenditure per capita, by region

Independent variable	Region										National
	1	2	3	4	5	6	7	8	9		
	NE	MA	ENC	WNC	SA	ESC	WSC	M	P		
Intercept	2.541*	3.074*	2.384*	1.162	2.216*	2.437*	1.640*	2.661*	2.772*	2.160*	
	(2.7)	(6.5)	(5.3)	(1.2)	(11.0)	(10.5)	(7.5)	(4.0)	(4.4)	(17.2)	
Income & bonus	.003	.002	.003	.007	.005*	.008*	.008*	.004	.004	.005*	
food stamps	(.7)	(1.3)	(1.2)	(1.6)	(5.1)	(5.8)	(6.4)	(1.4)	(1.4)	(8.1)	
Family size	-.133	-.294*	-.488*	-.140	-.233*	-.226*	-.254*	-.154	-.388*	-.317*	
	(-.8)	(-4.8)	(-5.8)	(-.9)	(-7.8)	(-5.8)	(-7.3)	(-1.8)	(-3.3)	(15.9)	
Central city	.089	-.168	1.474*	-.425	.154	-.164	-.145	-.441	-.381	-.171*	
	(.2)	(-.7)	(5.6)	(-.9)	(1.7)	(-1.2)	(-1.2)	(-1.6)	(-1.2)	(-2.7)	
Suburban	.388	-.723*	.172	-.505	-.216*	.245*	-.167	.085	-.968*	-.209*	
	(.8)	(-3.2)	(.7)	(-.4)	(-2.0)	(2.0)	(-1.6)	(.2)	(-3.4)	(-3.5)	
Black	.561	-.739*	.453*	-.535	.096	-.218	.198*	.136	.402	.264*	
	(.5)	(-2.8)	(2.1)	(-.4)	(1.1)	(-1.9)	(2.0)	(.3)	(1.5)	(4.6)	
Hispanic	.174	-.168	-.599	-.179	-1.064*	-.633	.241	.130	.208	.149	
	(.1)	(-.6)	(-1.3)	(-.1)	(-2.5)	(-1.3)	(1.4)	(.4)	(.6)	(1.4)	
Other race	-.298	.236	-.026	-.451	.520	.023	.083	-.280	.922	.188	
	(-.1)	(.3)	(-.1)	(-.8)	(.6)	(.1)	(.1)	(.7)	(1.7)	(1.0)	
School lunch	.461	.582	.333	-.189	.093	-.112	-.190	.130	.686	.268*	
	(1.0)	(3.1)	(1.2)	(-.4)	(.8)	(-.8)	(-1.3)	(.4)	(1.8)	(3.9)	
Food stamp	-.286	-.124	-.536*	.550	-.108	-.181	.319*	-.062	-.348	-.122*	
	(-.9)	(-.7)	(2.8)	(1.4)	(-1.3)	(-1.6)	(3.5)	(-.2)	(1.4)	(2.5)	
High school	-.775	.184	.036	.241	.359*	.020	.274*	-.168	.252	.290*	
	(-1.4)	(1.0)	(.2)	(.3)	(4.0)	(.2)	(2.8)	(-.6)	(.9)	(5.1)	
College	-.286	.324	.938*	.153	.155	.132	.549*	.125	.640	.743*	
	(-.5)	(1.2)	(3.3)	(.4)	(1.2)	(.5)	(2.9)	(.3)	(1.9)	(9.6)	
Employed	.663*	.182	.499	-.023	.100	-.076	-.115	-.025	.390	.167*	
	(2.0)	(.8)	(1.9)	(-.1)	(1.0)	(-.6)	(-1.1)	(-.1)	(1.3)	(2.7)	
Own home	.139	-.167	.575*	.245	-.241	.003	.318*	-.112	.351	.008	
	(.3)	(-.9)	(2.5)	(.3)	(-2.7)	(.1)	(3.4)	(-.4)	(1.3)	(.1)	
Noncash rent	.575	.692	-2.849*	.847	-.202	-.062	.500*	2.672*	1.971*	.399*	
	(.5)	(.9)	(-6.5)	(1.0)	(-1.0)	(-.3)	(2.9)	(3.8)	(4.4)	(3.4)	
Life cycle 2	.336	-.060	-.092	1.130	.104	-.055	.514*	-.013	.117	.049	
	(.6)	(-.2)	(-.3)	(.7)	(.7)	(-.3)	(2.7)	(-.1)	(.3)	(.5)	
Life cycle 3	1.349	.061	-.439	1.130	.523*	-.149	.156	-.593	.019	.178	
	(1.1)	(.1)	(-.8)	(.7)	(2.1)	(-.4)	(.4)	(-.7)	(.1)	(1.1)	
Life cycle 4	-.188	1.406*	-.346	4.119*	-.049	.076	-.003	-.585	.879	.608*	
	(-.3)	(3.2)	(-.8)	(3.7)	(-.2)	(.2)	(-.1)	(-1.2)	(1.7)	(5.1)	
Life cycle 5	-.612	.146	1.133*	.868	.140	-.741*	.104	.122	.881*	.369*	
	(-.8)	(.6)	(3.2)	(1.5)	(1.0)	(-4.1)	(.6)	(.3)	(2.1)	(4.2)	
Life cycle 6	.315	.005	.071	.726	.577*	.253	.250	-.197	.692	-.075	
	(.4)	(.1)	(.2)	(.7)	(3.3)	(1.2)	(1.3)	(-.3)	(.9)	(-.7)	
Life cycle 7	-.090	.307	1.109*	1.340*	.813*	-.360	.407*	-.371	.514	.714*	
	(-.1)	(.8)	(2.8)	(2.0)	(5.1)	(-1.7)	(2.1)	(-.7)	(1.1)	(6.8)	
Life cycle 8	.415	1.220*	-.184	.794	-.039	-.026	.354*	.559	2.038*	.287*	
	(.5)	(3.1)	(-.4)	(1.4)	(-.2)	(-.1)	(2.0)	(.9)	(3.3)	(2.7)	
Life cycle 9	.021	1.653*	1.276*	1.488	.937*	.586*	.976*	.172	1.550*	1.263*	
	(.1)	(4.1)	(3.1)	(1.9)	(5.1)	(2.8)	(5.2)	(.3)	(3.3)	(11.5)	
R ²	.338	.347	.484	.322	.214	.211	.182	.402	.423	.205	
F-ratio	1.14	9.15	20.02	1.72	14.56	8.97	11.72	2.91	8.70	53.88	

* = Significant at 0.05 level.

t-ratio in parentheses

Appendix table 7--Estimated regression coefficients: Sugars, fats, and miscellaneous weekly expenditure per capita, by region



Independent variable	Region									National
	1	2	3	4	5	6	7	8	9	
	NE	MA	ENC	WNC	SA	ESC	WSC	M	P	
Intercept	4.665*	2.863*	3.078*	3.734*	3.135*	2.703*	2.646*	4.150*	2.244*	2.820*
	(3.2)	(6.2)	(7.4)	(3.6)	(12.1)	(10.8)	(10.4)	(3.4)	(2.7)	(20.9)
Income & bonus food stamps	.001	.005*	.006*	.011*	.004*	.010*	.008*	-.001	.012*	.007*
	(.2)	(2.9)	(2.7)	(2.4)	(3.8)	(6.7)	(5.3)	(-.2)	(3.3)	(10.3)
Family size	-.490	-.051	-.306*	-.551*	-.267*	-.224*	-.271*	-.270	-.419*	-.286*
	(-1.8)	(-.8)	(-3.9)	(-3.4)	(-7.0)	(-5.3)	(-6.7)	(-1.7)	(-2.7)	(-13.3)
Central city	.418	-.436	.511*	.754	-.018	.077	-.281*	-.025	.454	-.024
	(.7)	(-1.8)	(2.1)	(1.6)	(-.2)	(.5)	(-2.0)	(-.1)	(1.1)	(-.3)
Suburban	.153	-1.042*	-.733*	4.836*	.235	.035	-.338*	-1.465*	.667	-.163*
	(.2)	(-4.7)	(-3.3)	(-3.4)	(1.7)	(.3)	(-2.9)	(-2.1)	(1.8)	(-2.5)
Black	.271	-.818*	-.677*	-1.223	-.595*	-.468*	-.159	-1.401	-.182	-.408*
	(.2)	(-3.2)	(-3.4)	(-1.8)	(-5.4)	(-3.9)	(-1.4)	(-1.8)	(-.5)	(-6.7)
Hispanic	-.824	.148	.003	-.944	-.923	-.642	-.313	-1.000	-.014	-.174
	(-4)	(-.5)	(-.1)	(-6)	(-1.7)	(-1.2)	(-1.5)	(-1.7)	(-.1)	(-1.6)
Other race	-.992	-.311	-.688	-.472	-1.223	-1.510*	-.429	1.859*	1.580*	.523*
	(-2)	(-.4)	(-1.4)	(-.3)	(-1.1)	(-2.2)	(-.6)	(2.5)	(2.2)	(2.7)
School lunch	.126	.082	-.078	.402	.005	.231	.270	.011	.029	.204*
	(.2)	(.4)	(-.3)	(.7)	(.1)	(1.5)	(1.6)	(.1)	(.1)	(2.8)
Food stamp	.035	.233	.189	.092	.500*	-.178	.110	.920	-.231	.242*
	(.1)	(1.4)	(1.1)	(.2)	(4.8)	(-1.5)	(1.1)	(1.9)	(-.7)	(4.6)
High school	-.412	-.133	-.115	-1.126*	.015	.021	-.121	-.405	.796	.105
	(-.5)	(-.7)	(-.6)	(-2.8)	(.1)	(.2)	(-1.1)	(-.7)	(2.2)	(1.7)
College	-1.083	-.553*	.690*	-3.000*	.853*	-.125	.027	.355	.014	.411*
	(-1.2)	(-2.0)	(2.6)	(-4.0)	(5.0)	(-.5)	(.1)	(.5)	(.1)	(4.9)
Employed	.178	-.693*	.082	.927*	-.230	-.153	-.035	1.047*	-.285	-.270*
	(.3)	(-3.2)	(.3)	(2.2)	(-1.8)	(-1.1)	(-.3)	(2.3)	(-.7)	(-4.1)
Own home	.738	.391*	.368	.030	-.836	-.410*	.255*	-.653	-.536	.058
	(1.0)	(2.2)	(1.8)	(.1)	(-.8)	(-3.3)	(2.3)	(-1.2)	(-1.5)	(1.0)
Noncash rent	1.080	1.234	-1.266*	(-.056)	-.551*	-.443	.479*	-1.241	-.594	-.227
	(.6)	(1.7)	(-3.1)	(-.1)	(-2.1)	(-1.7)	(2.4)	(-1.0)	(-1.0)	(-1.8)
Life cycle 2	.435	-.250	-.364	.766	.489*	-.244	-.163	-.573	.109	-.032
	(.5)	(-.9)	(-1.2)	(.9)	(2.4)	(-1.2)	(-.7)	(-.8)	(.2)	(-.3)
Life cycle 3	.329	.038	.125	2.868	-.255	.319	.198	.308	-.960	-.063
	(.2)	(.1)	(.3)	(1.7)	(-.8)	(.7)	(-.5)	(.2)	(-1.0)	(-.4)
Life cycle 4	.236	2.724*	-.372	1.266	1.642*	.834*	1.304*	-2.261*	1.268	.896*
	(.3)	(6.2)	(-.9)	(1.1)	(5.1)	(2.5)	(3.2)	(-2.6)	(1.9)	(7.1)
Life cycle 5	-.401	-.187	.675*	1.215*	.231	-.330	-.047	.205	.759	.167
	(-.3)	(-.8)	(2.0)	(2.0)	(1.3)	(-1.7)	(-.2)	(.3)	(1.4)	(1.8)
Life cycle 6	.694	-.174	.264	.144	-.164	.665*	-.310	-.295	1.041	-.109
	(.5)	(-.6)	(.6)	(.1)	(-.7)	(2.9)	(-1.4)	(-.3)	(1.0)	(-1.0)
Life cycle 7	-.166	-.048	.688	.481	.276	.548*	.097	.467	1.185	.588*
	(-.1)	(-.1)	(1.8)	(.7)	(1.3)	(2.4)	(.4)	(.5)	(1.9)	(4.9)
Life cycle 8	-.770	-.544	-.302	-1.160	-.084	.381	.080	-.512	-.763	.036
	(-6)	(-1.4)	(-.7)	(-1.6)	(-.4)	(1.8)	(.4)	(-.4)	(-.9)	(.3)
Life cycle 9	-1.819	-.256	.445	-.565	-.412	.094	.207	1.291	.018	.115
	(-1.3)	(-.6)	(1.1)	(-.7)	(-1.7)	(.4)	(.9)	(1.4)	(.1)	(1.0)
R ²	.231	.296	.269	.483	.250	.173	.117	.419	.312	.134
F-ratio	.67	7.22	7.85	3.40	17.85	7.01	6.95	3.11	5.38	32.23

* = Significant at 0.05 level.

t-ratio in parentheses